



FedFleet 2022: Federal Automotive Statistical Tool - FY 2021 Fleet Trends and Data Quality

May 2022

Changing the World's Energy Future

Ron Stewart



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Federal Automotive Statistical Tool
FY 2021 Fleet Trends & Data Quality
FedFleet 2022



FY 2021 Fleet Data

Datacall Overview • Comparison to Recent Years • High-level Trends

Data Call Overview

- **Fleet data submissions from 49 agencies**
- **Timeline**
 - Data call opened October 1, 2021
 - ... closed December 15, 2021
 - Review feedback to agencies January 24, 2022
 - Agency updates due February 21, 2022
 - Dataset declared final February 25, 2022
- **Dataset**
 - 706K vehicles
 - 1.06M fuel entries
 - 32.5M data points



FY 2021 Federal Fleet by the Numbers



Inventory

657K vehicles

vs FY 2020: -0.1% ↓

vs FY 2019: +1.8% ↑

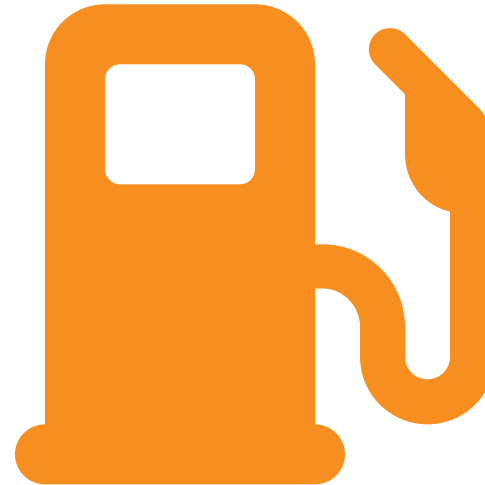


Miles

4.22B miles

vs FY 2020: +1.5% ↑

vs FY 2019: -6.1% ↓



Fuel

368M GGEs

vs FY 2020: -1.1% ↓

vs FY 2019: -5.1% ↓



Cost

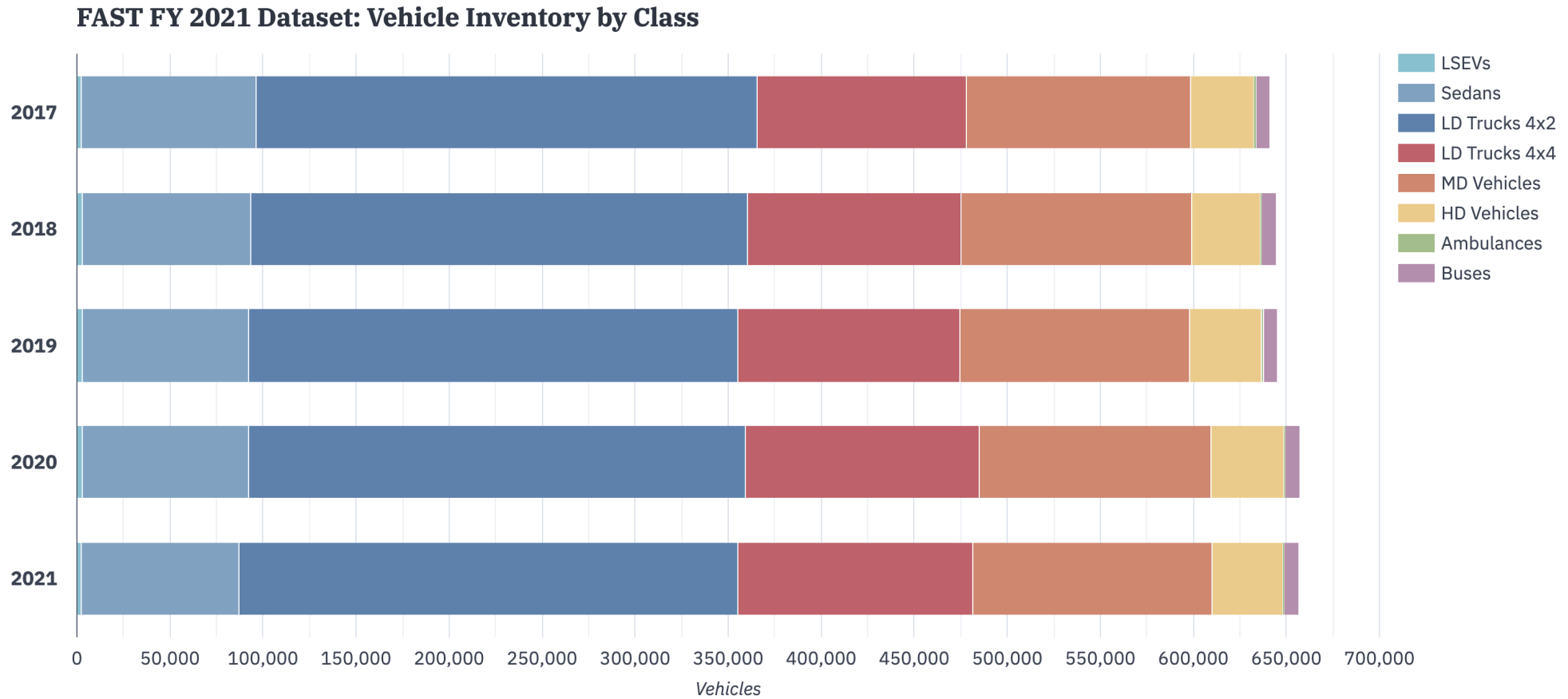
\$ 4.44B

vs FY 2020: +5.0% ↑

vs FY 2019: +1.6% ↑

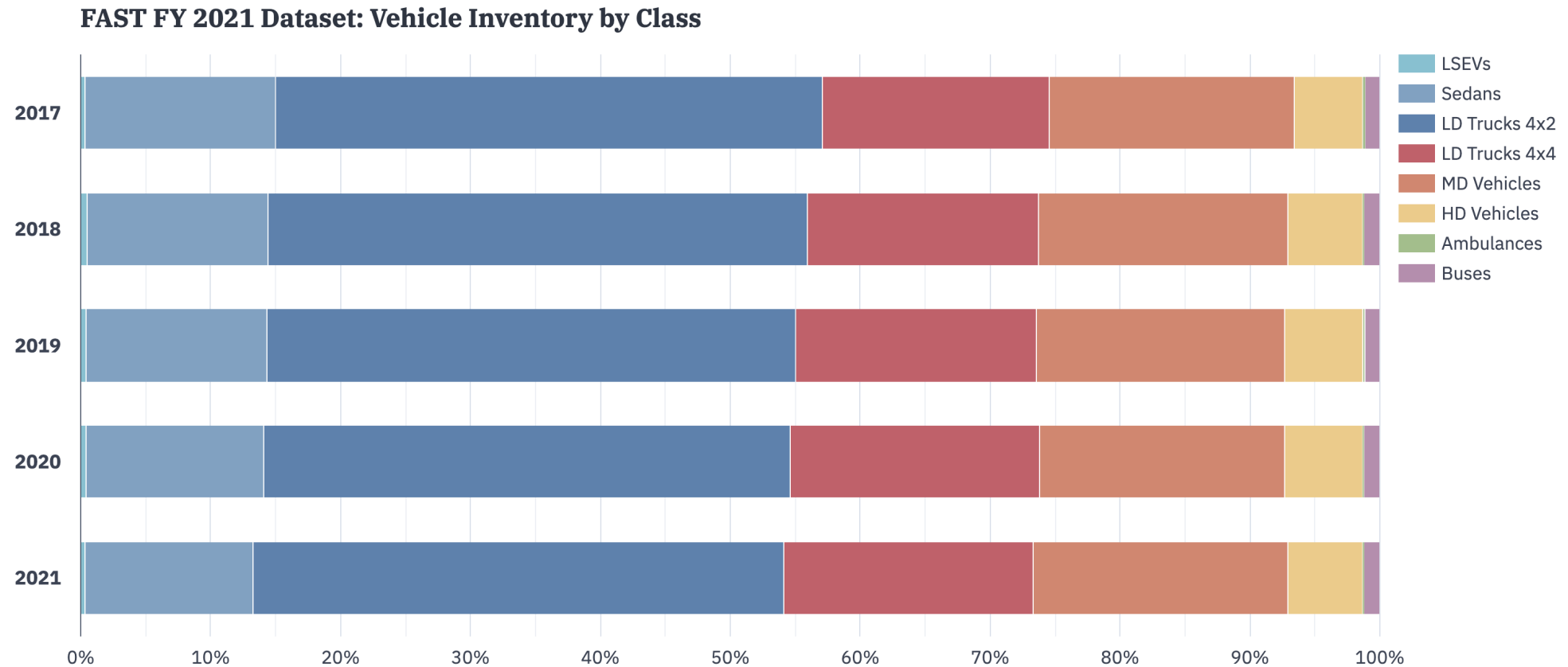
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>
Cost figures include only operating costs (lease, maintenance, accident repair, fuel, indirect costs, depreciation)
and do not include costs associated with vehicle acquisition or disposal

Fleet Trends: Vehicle Inventory



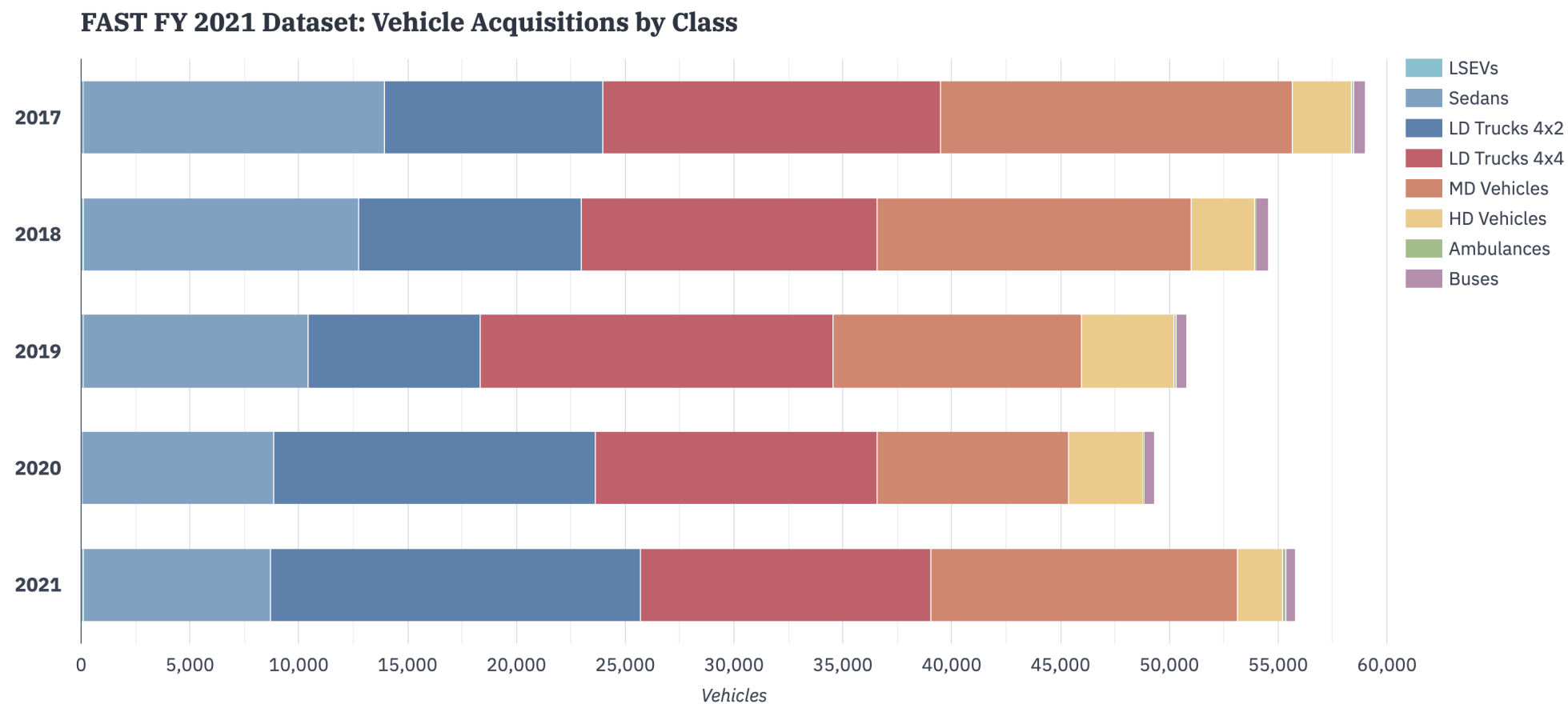
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Vehicle Inventory



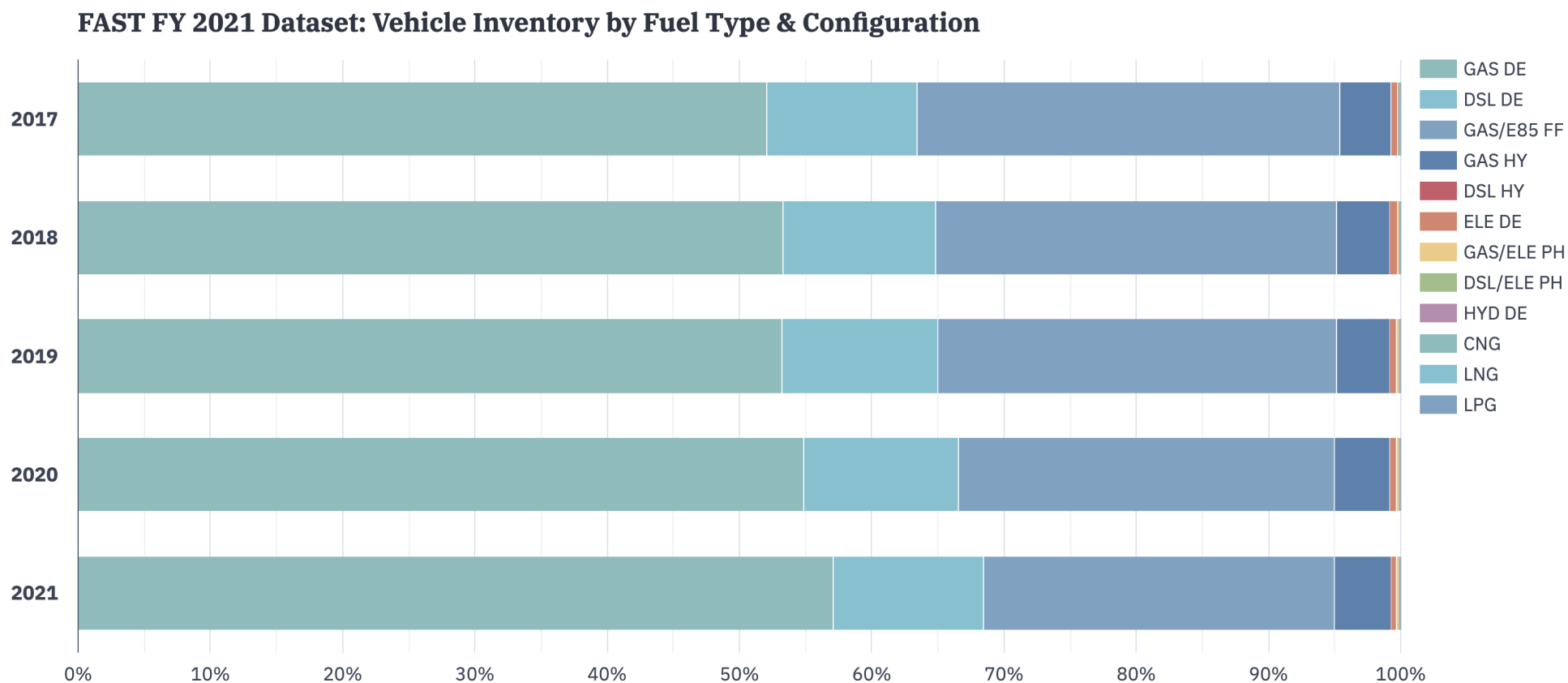
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Vehicle Acquisitions



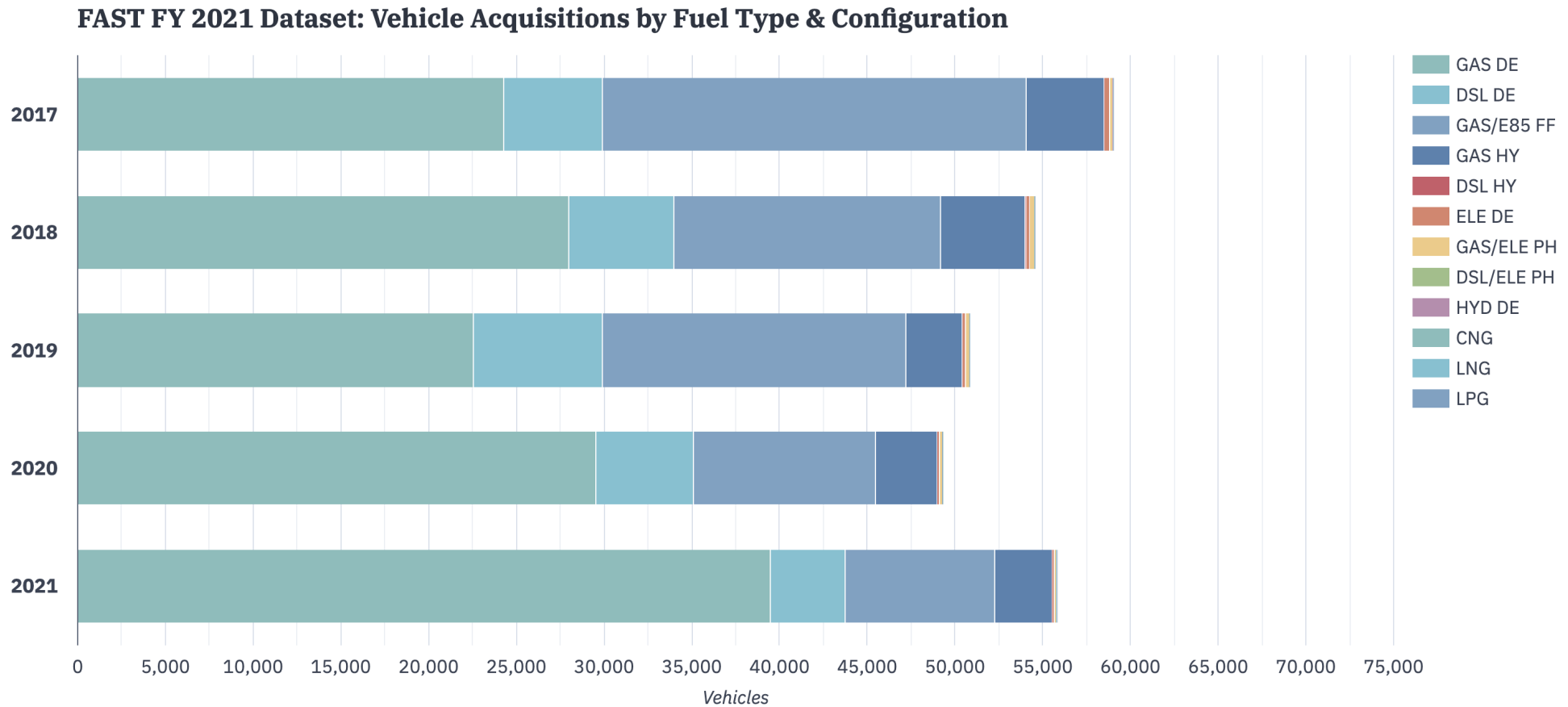
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Vehicle Fuel Type/Configuration



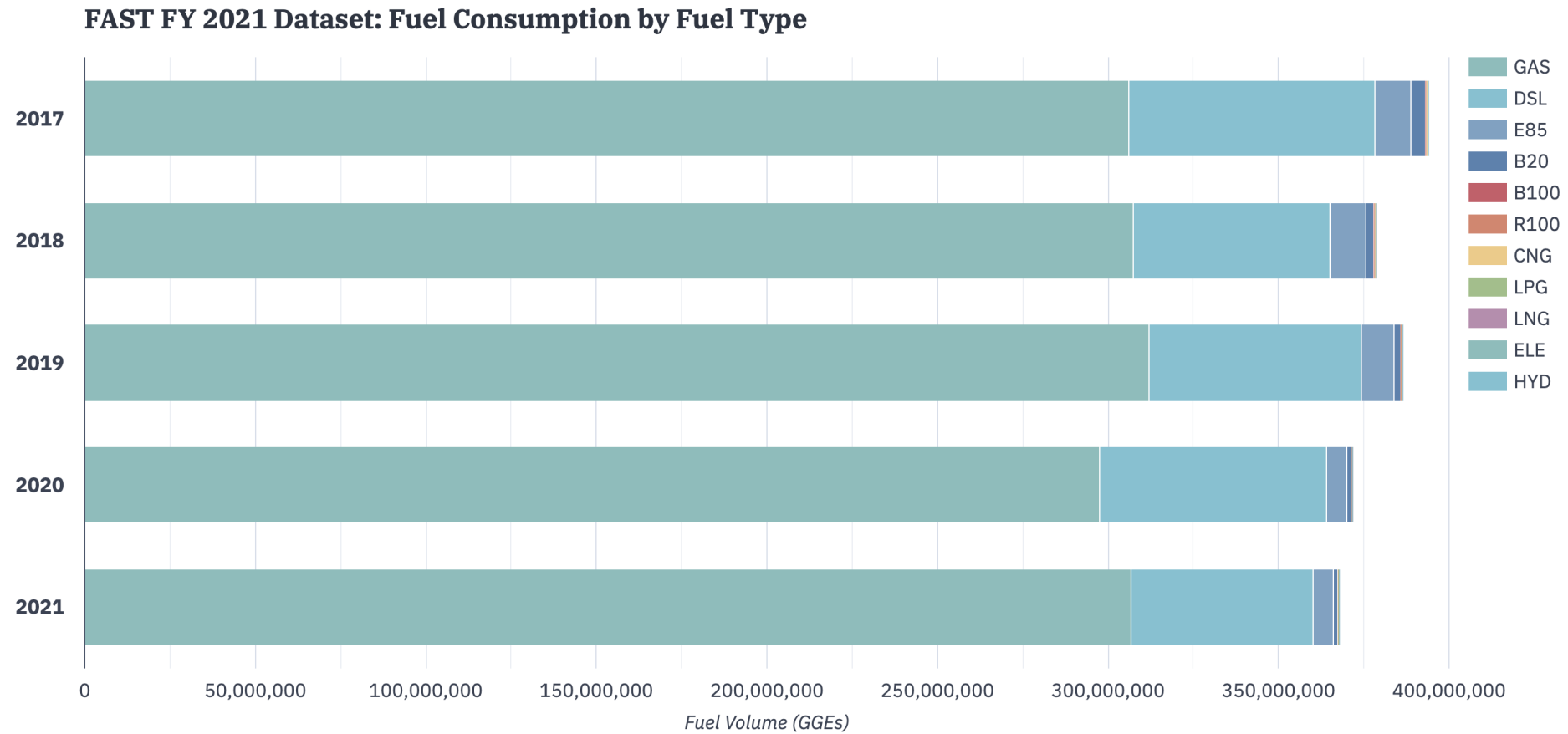
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Vehicle Fuel Type/Configuration



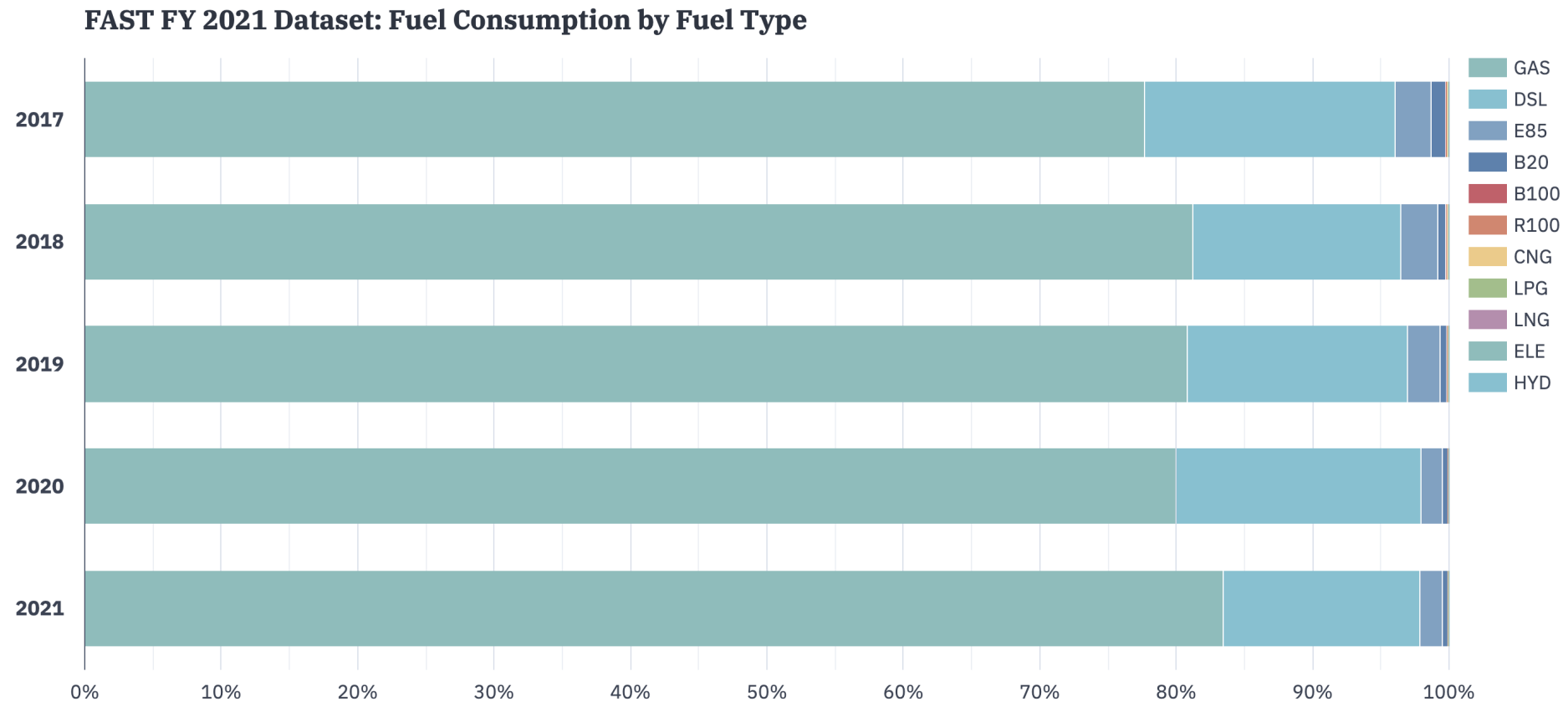
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Fuel Consumption



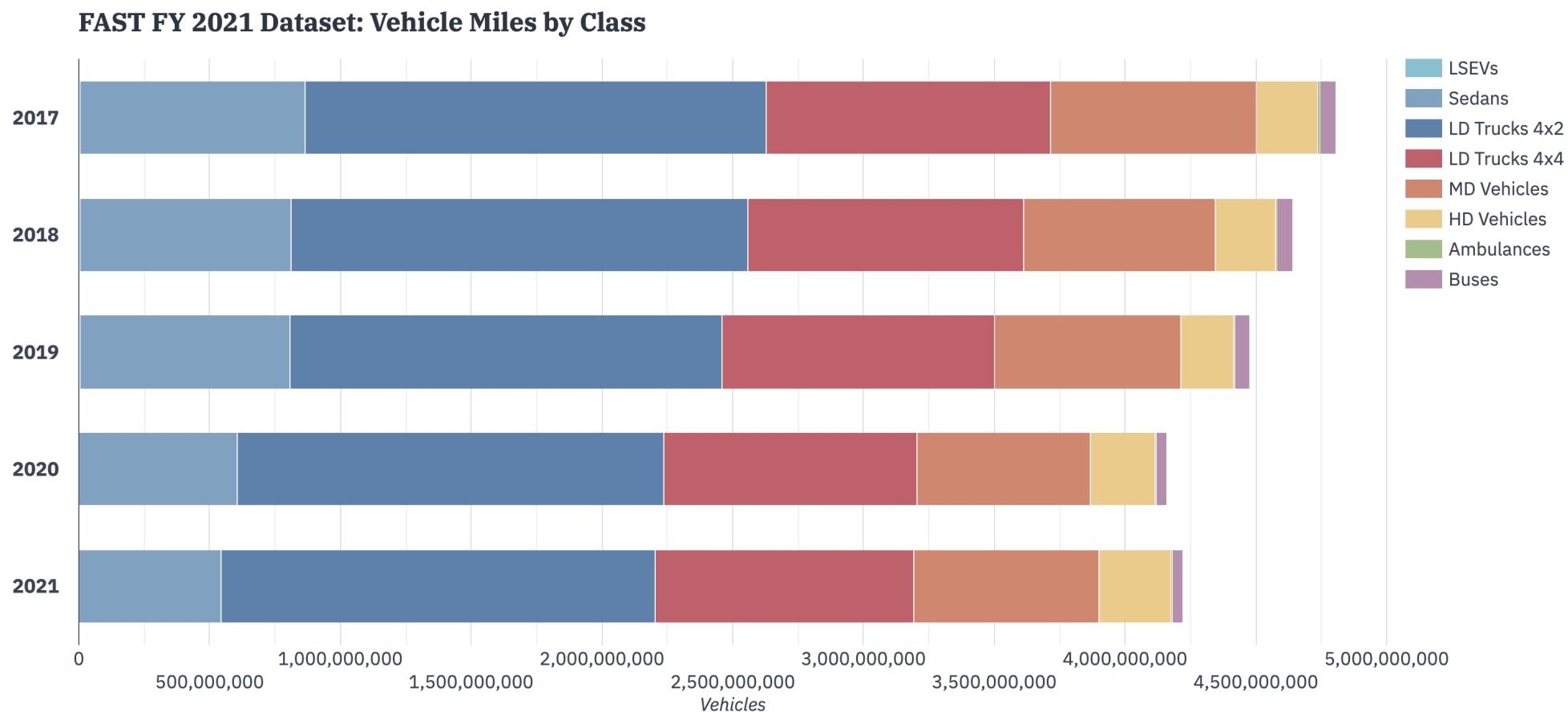
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Fuel Consumption



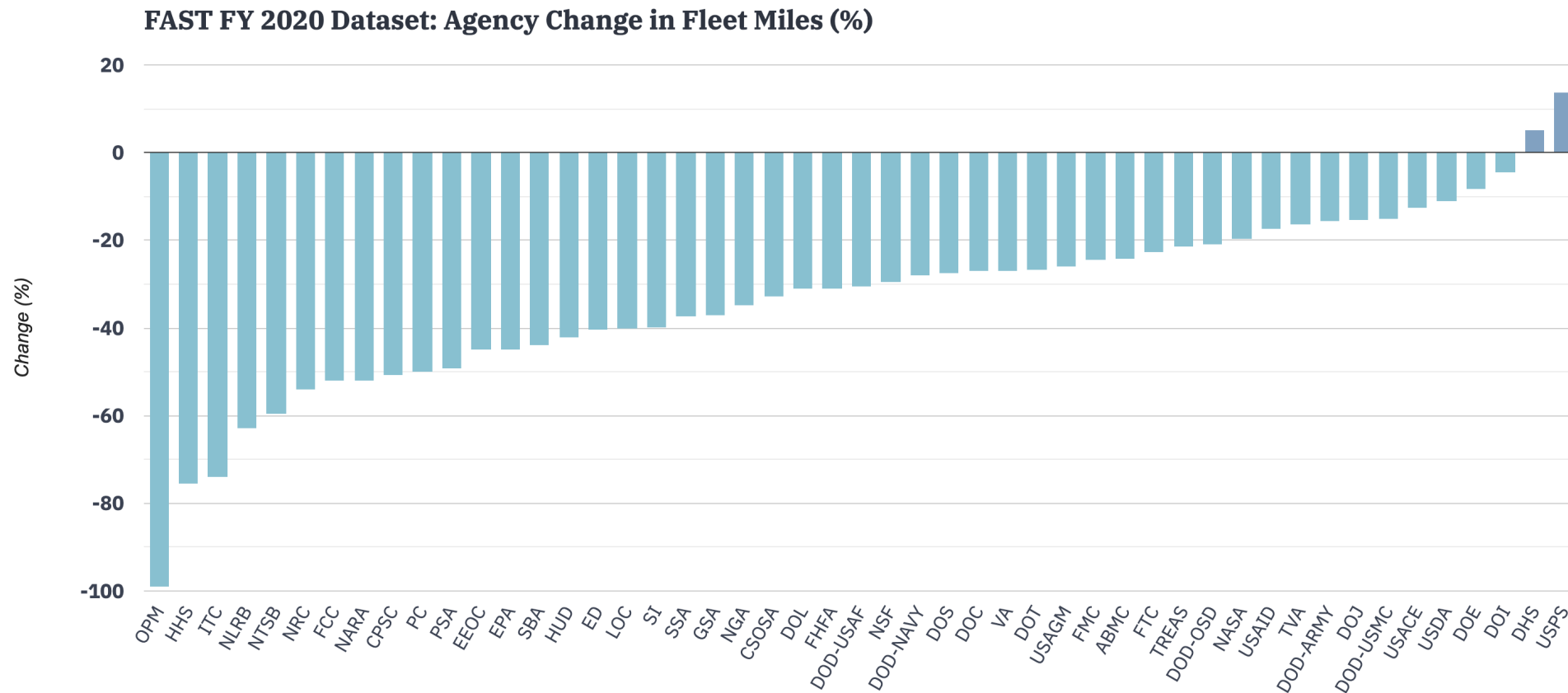
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Fleet Miles



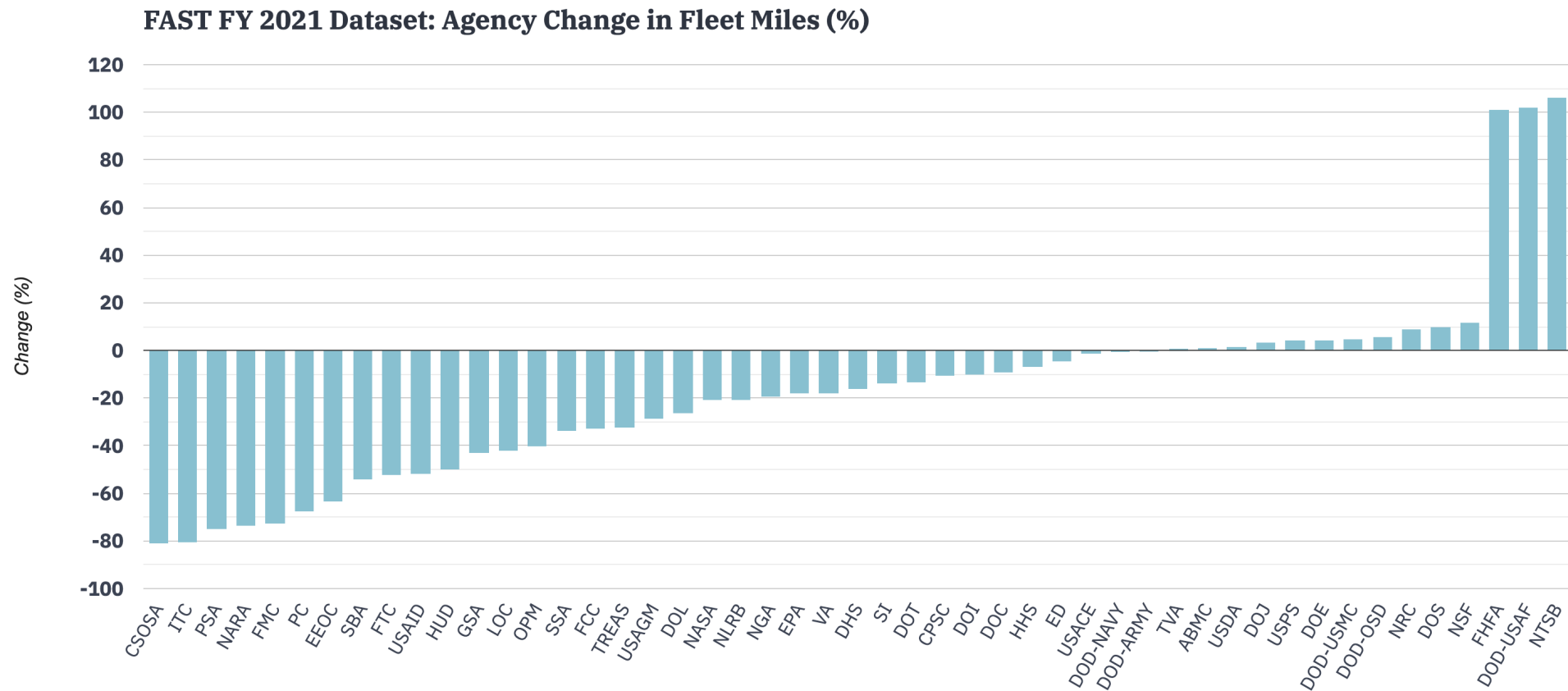
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Fleet Miles by Agency



Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Fleet Trends: Fleet Miles by Agency



Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>



Data Quality

Review Process • Quality Metric • Another Way to Look at Quality?

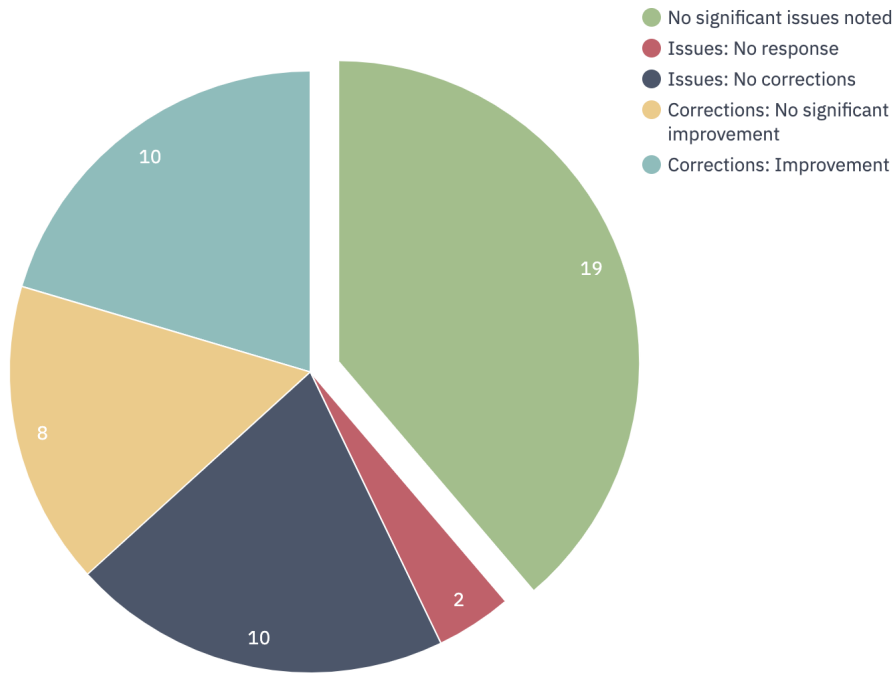
Data Quality: Our Review Process

- **Agency submissions reviewed against 8 groups of metrics**
 - 5 groups look at aggregated data for consistency with prior submissions
 - 3 groups look at individual vehicle-level data for specific types of year-to-year consistency, completeness, and quality concerns
- **All organizations received written feedback, with opportunity to provide updates to address any identified concerns**
 - EAct-covered/scorecard agencies received additional compliance impact review

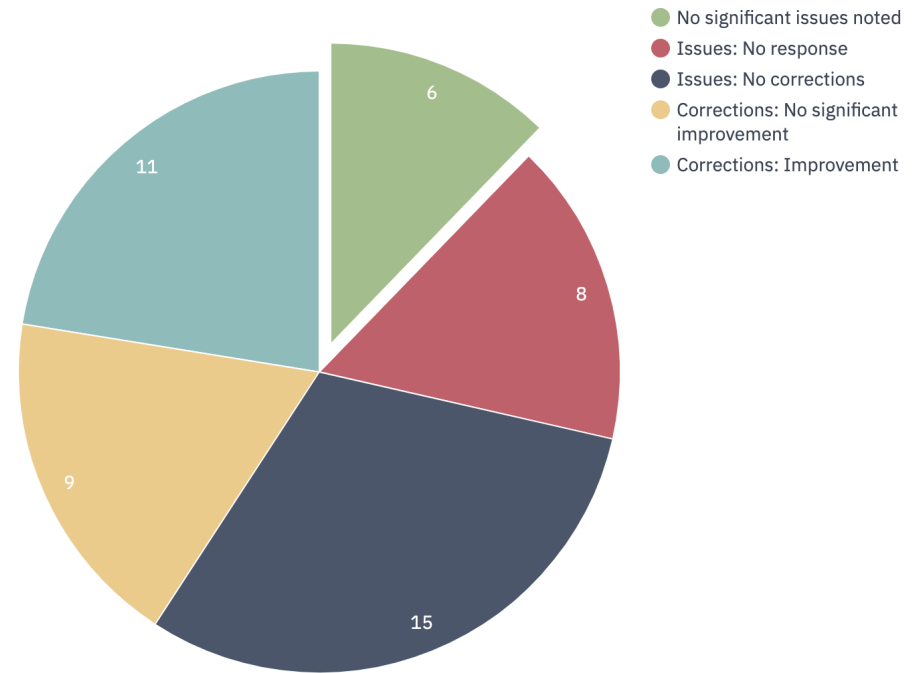


Data Quality: Our Review Process



FAST FY 2020 Dataset: Dataset Review



FAST FY 2021 Dataset: Dataset Review



Data Quality: Our Quality Metric

- **FY 2020, we piloted “Concerns per Vehicle” (CpV) quality metric**
 - Aggregate of occurrences of 12 types of problems
 - Enables comparison of quality over time or between agencies
 -  Metric decreases? Fewer issues, improved quality
 -  Metric increases? More issues, decreased quality
- **Measures come from both input validation and post-submission review**
- **Overall CpV scores**
 - FY 2020: 0.76
 - FY 2021: 0.60 (~20% improvement)

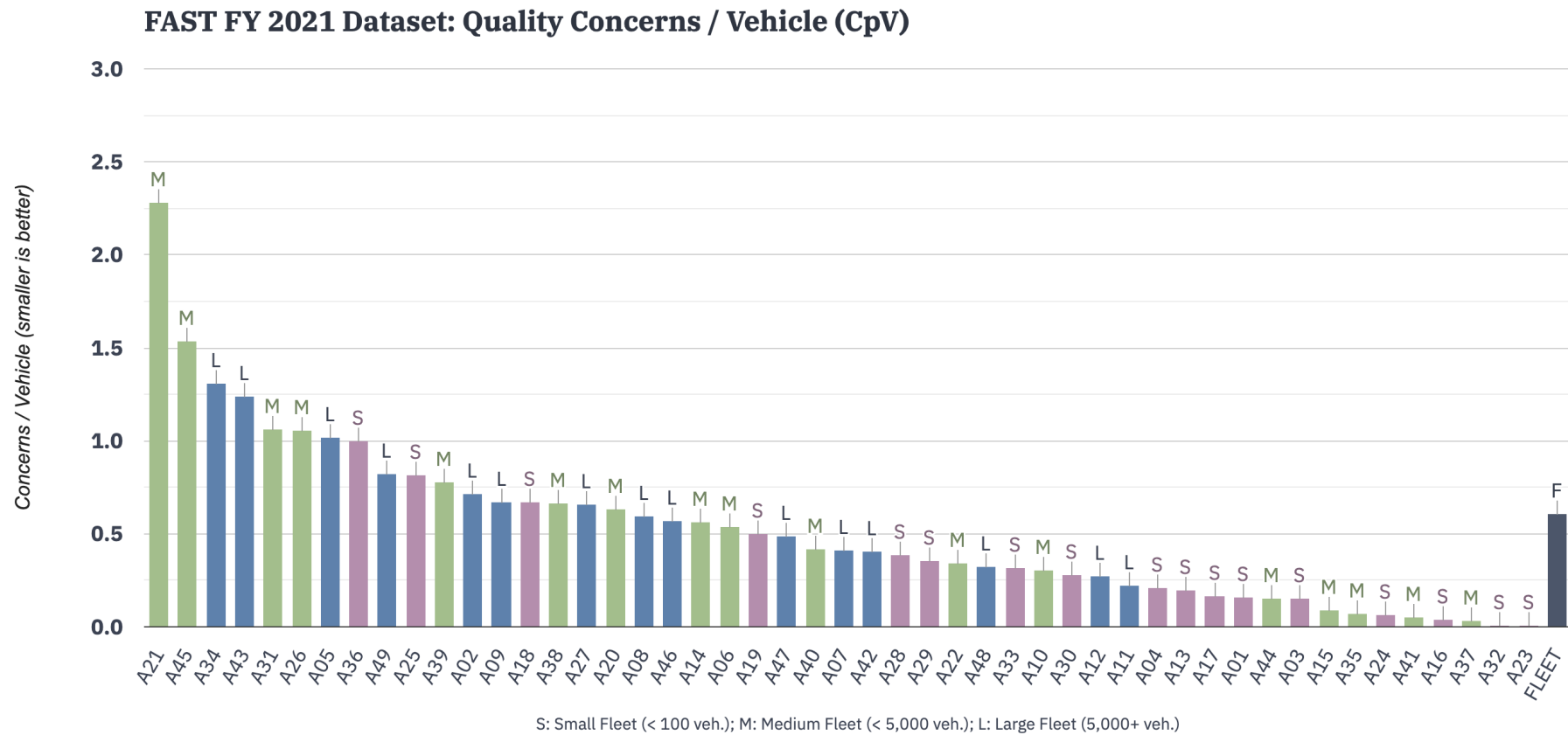


Data Quality: Our Quality Metric

Quality metric aggregates counts of individual measures:

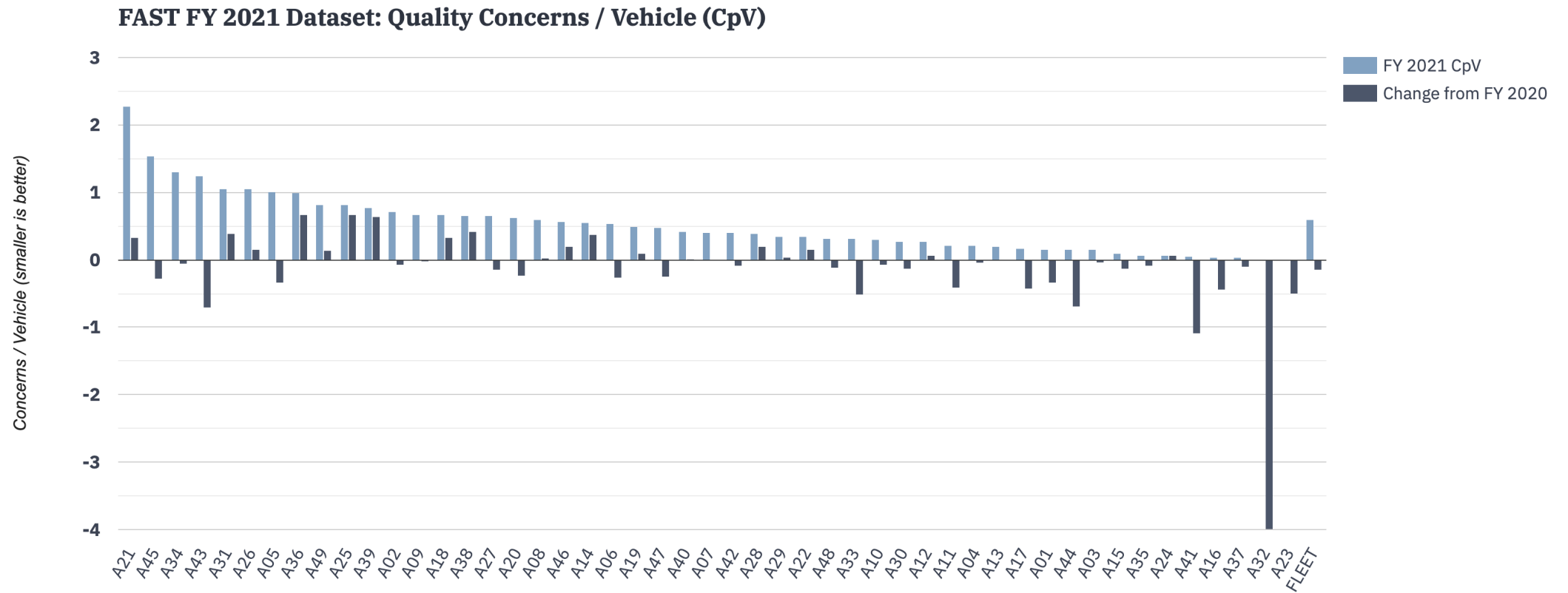
- ↓ **OC-1.5:** Inconsistent year-to-year acquisition costs
- ↓ **F-2.2:** Consumption of fuel inconsistent with vehicle fuel type/config
- ↓ **F-2.3:** Consumption of B100 w/o DSL
- ↓ **F-2.4:** PHEVs w/o ELE consumption
- ↑ **F-4.6:** Invalid high fuel efficiency
- ↓ **F-5.5:** Unreasonable fuel cost
- ↑ **M7(a):** Acquisition dates in current year and reported in prior year
- ↓ **M7(b):** Acquisition dates in prior year and not reported in prior year
- ↑ **M7(c):** Disposal information reported in prior year and reported again in current year
- ↑ **M7(d):** Reported in prior year and not reported in current year
- ↓ **M7(e):** Year-to-year changes of static vehicle attributes
- ↓ **M8:** Use placeholder values for key vehicle attributes

Data Quality: Our Quality Metric



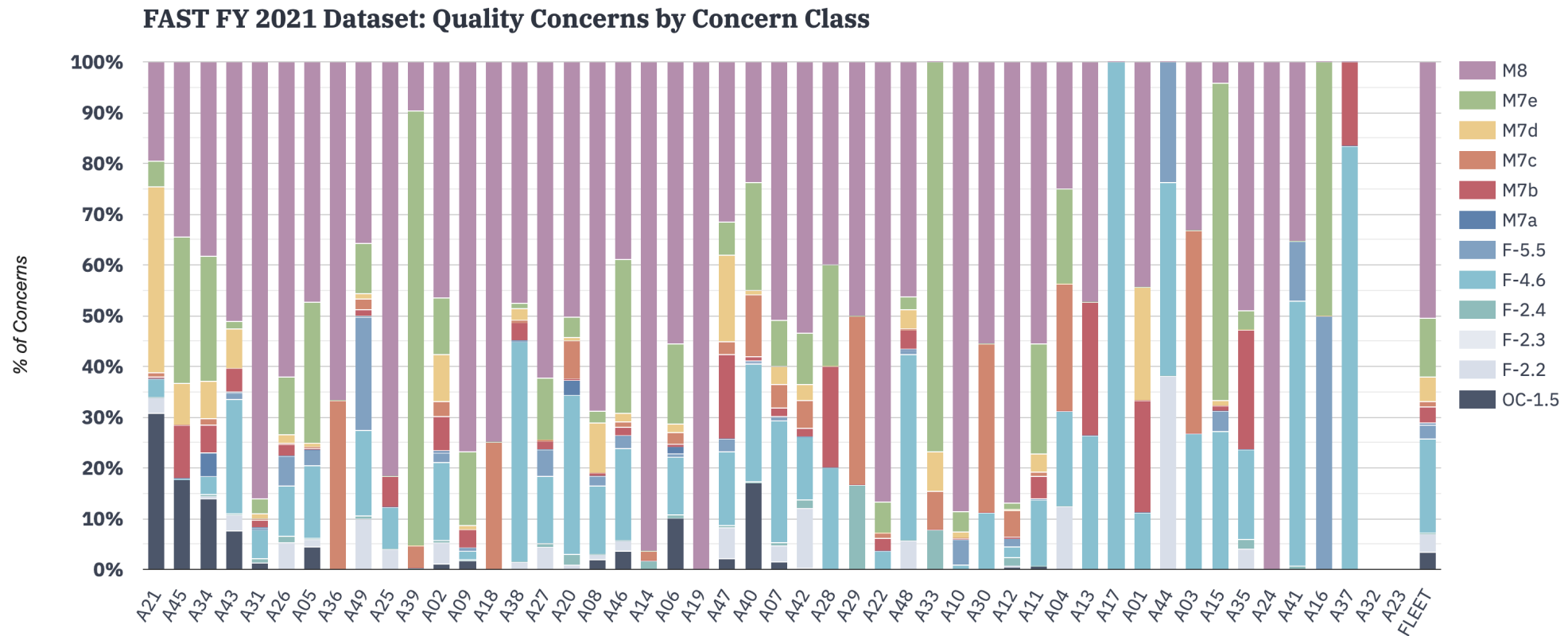
Source: Federal Automotive Statistical Tool, <https://fastweb.inl.gov/>

Data Quality: Our Quality Metric



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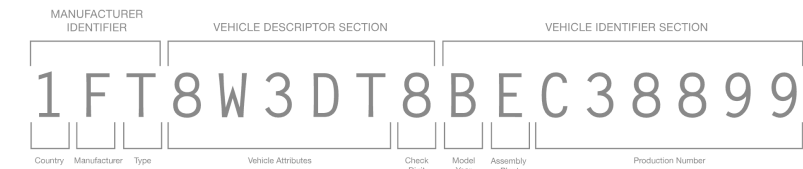
Data Quality: Another Way of Looking at It?

- **Our current review processes look at consistency and “reasonable-ness”**
- **Can we tell how accurate the data is?**
 - Short Answer: Not really
 - Nuanced Answer: Maybe, for certain aspects, by analyzing VINs used as Vehicle IDs for some of the vehicles?



Data Quality: VINs

- **All vehicles have VINs, but...**
 - ... not all agencies use them for reporting
 - ... some agencies that *do* use them for reporting have errors in their VINs
 - ... multiple VIN standards for domestic vs international vehicles, large OEMs vs small
 - ... VIN standards have changed over time
 - ... not all manufacturers provide consistent detail to NHTSA
 - ... lots of info available from a VIN, but only a few attributes relevant to FAST reporting
 - ... decoding VINs has historically been slow and/or expensive



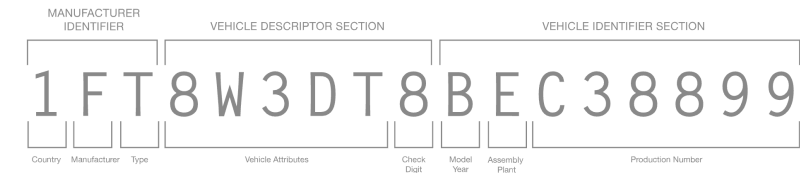
Here is a table simplifying the VIN:

VIN Digit	Meaning
1 st digit	Country
2 nd digit	Region / Maker
3 rd digit	Vehicle Type
4 th digit	Vehicle Attributes
5 th digit	Vehicle Attributes
6 th digit	Vehicle Attributes
7 th digit	Vehicle Attributes
8 th digit	Vehicle Attributes
9 th digit	Check digit

VIN Digit	Meaning
10 th digit	Year
11 th digit	Assembly Plant
12 th digit	Sequential Number
13 th digit	Sequential Number
14 th digit	Sequential Number
15 th digit	Sequential Number
16 th digit	Sequential Number
17 th digit	Sequential Number

Data Quality: VIN Decoding Analysis

- **DOT/NHTSA now shares a resource enabling bulk VIN decoding**
- **FAST team's preliminary analysis**
 - Decoded VINs from FY 2020 & 2021 datasets
 - Analyzed decoded information to determine what we can tell about vehicles
 - Compared vehicle attributes from VINs with agency-reported attributes to gauge aspects of accuracy



Here is a table simplifying the VIN:

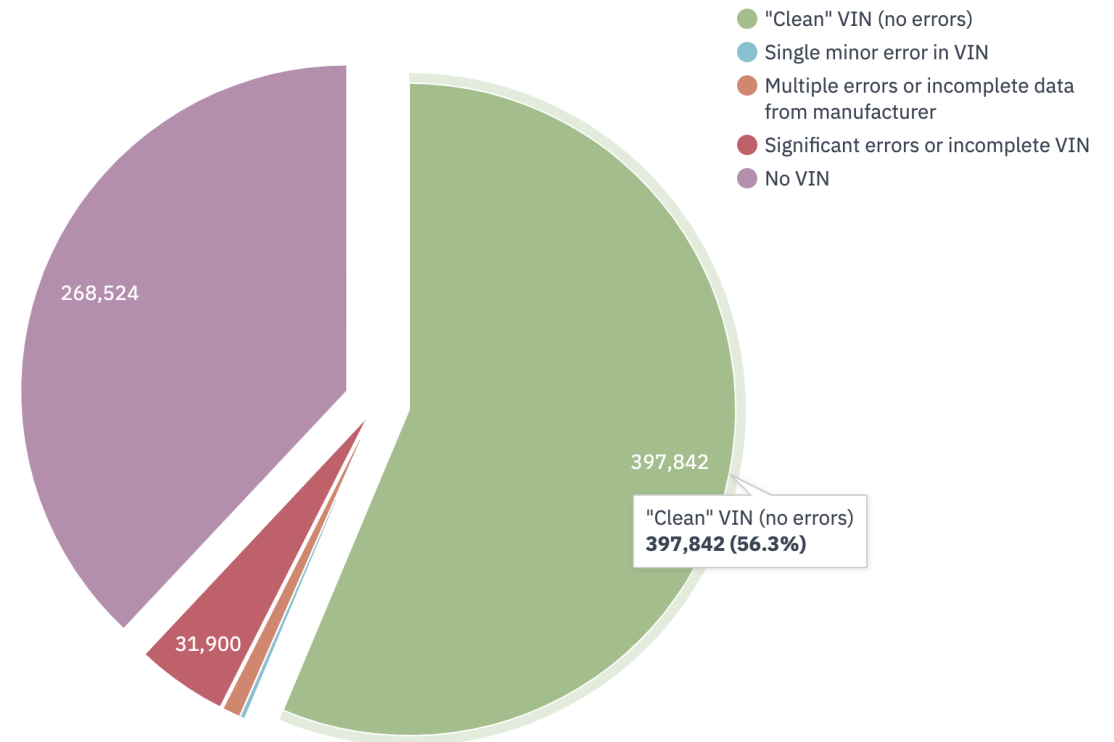
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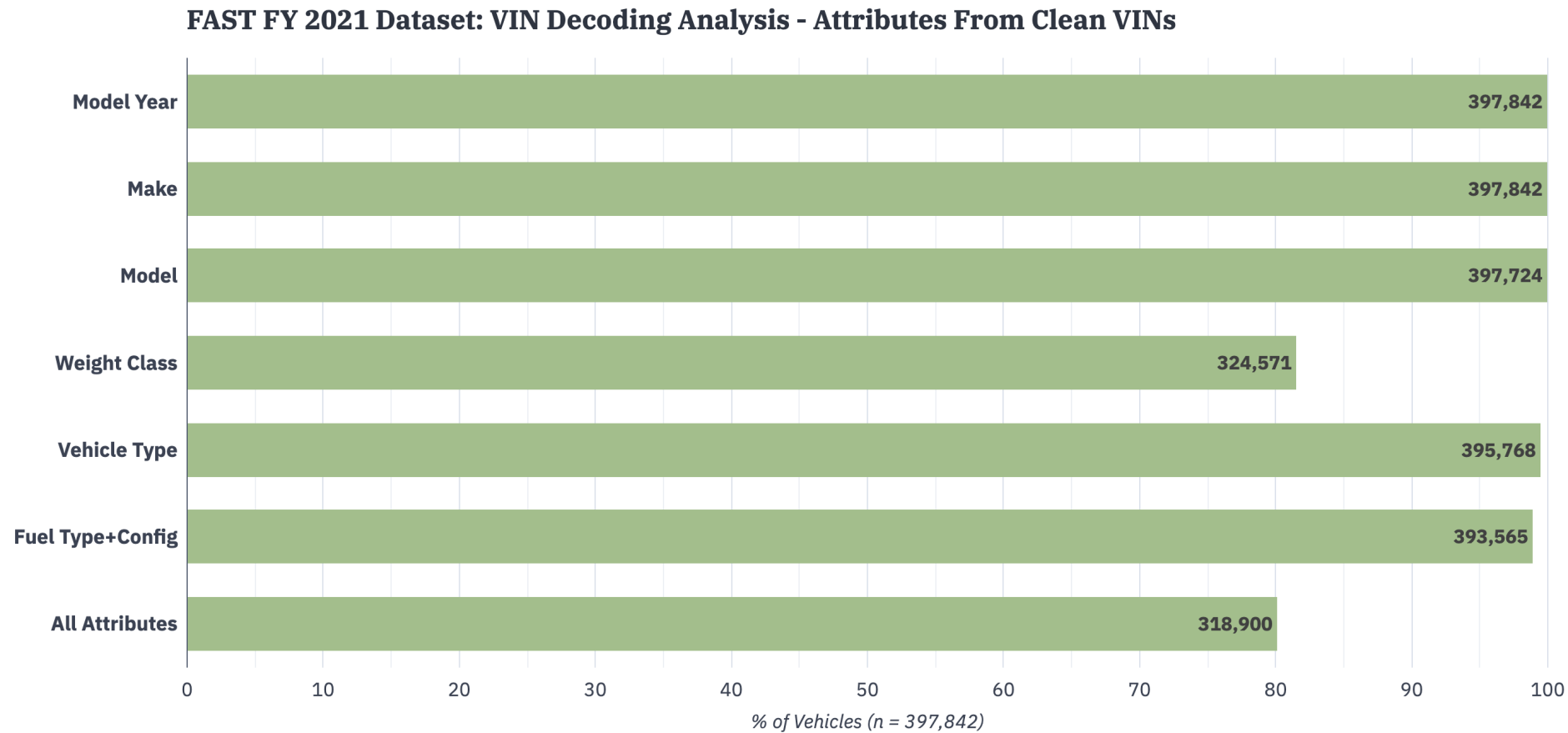
Data Quality: VIN Decoding Analysis

- **FAST FY 2021 dataset**
 - ~705K vehicles
 - ~438K vehicles with VIN(-ish?) ID
- **Decoded with DOT/NHTSA's vPIC decoding process**
 - Categorized VIN based on extent of errors noted in decoding
 - Identified FAST-relevant vehicle attributes available from VIN

FAST FY 2021 Dataset: VIN Decoding Analysis

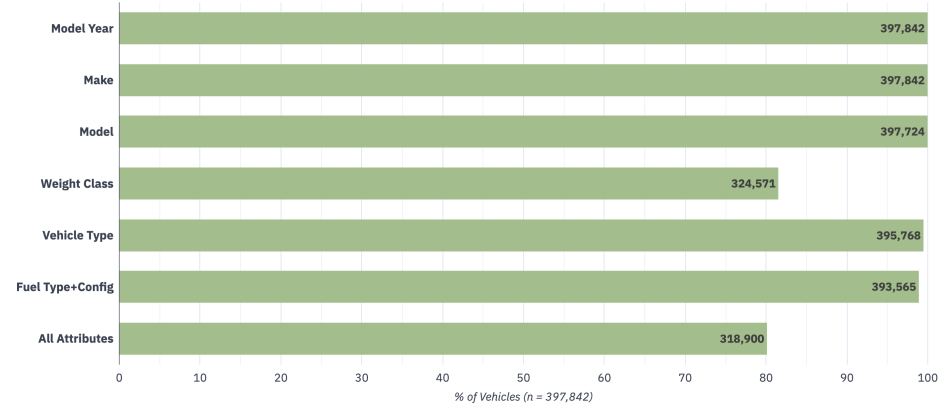


Data Quality: VIN Decoding Analysis

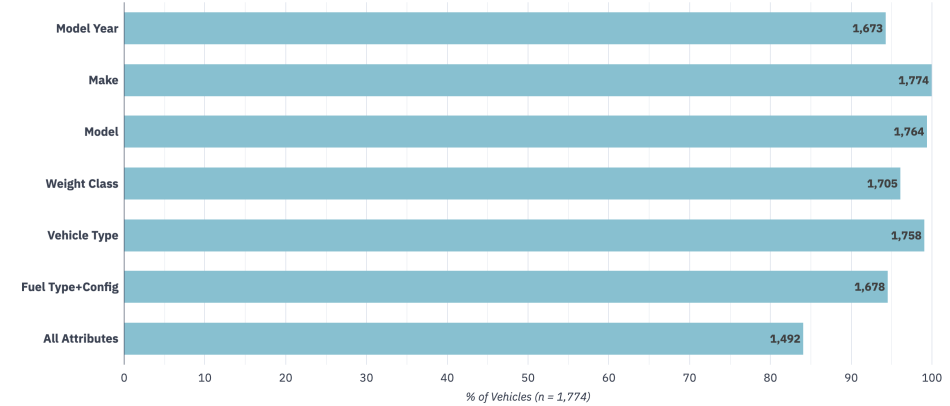


Data Quality: VIN Decoding Analysis

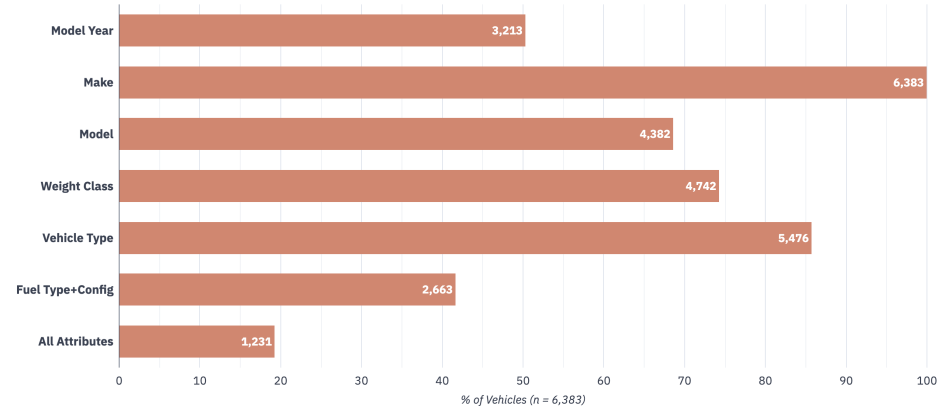
FAST FY 2021 Dataset: VIN Decoding Analysis - Attributes From Clean VINs



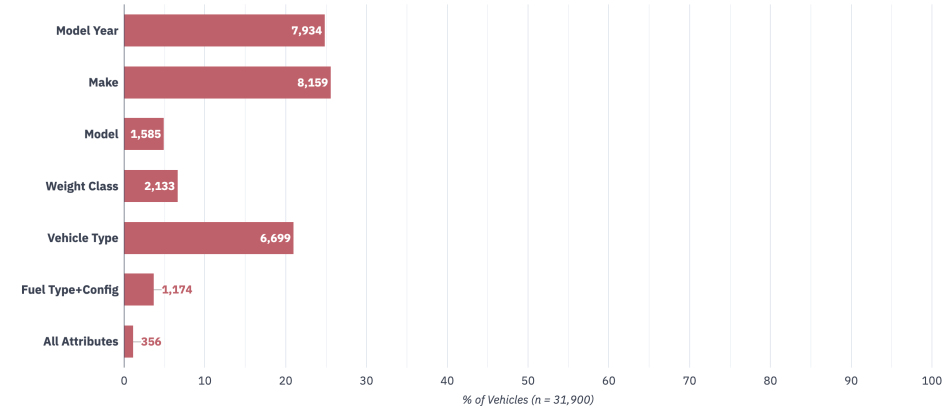
FAST FY 2021 Dataset: VIN Decoding Analysis - Attributes From VINs w/Minor Errors



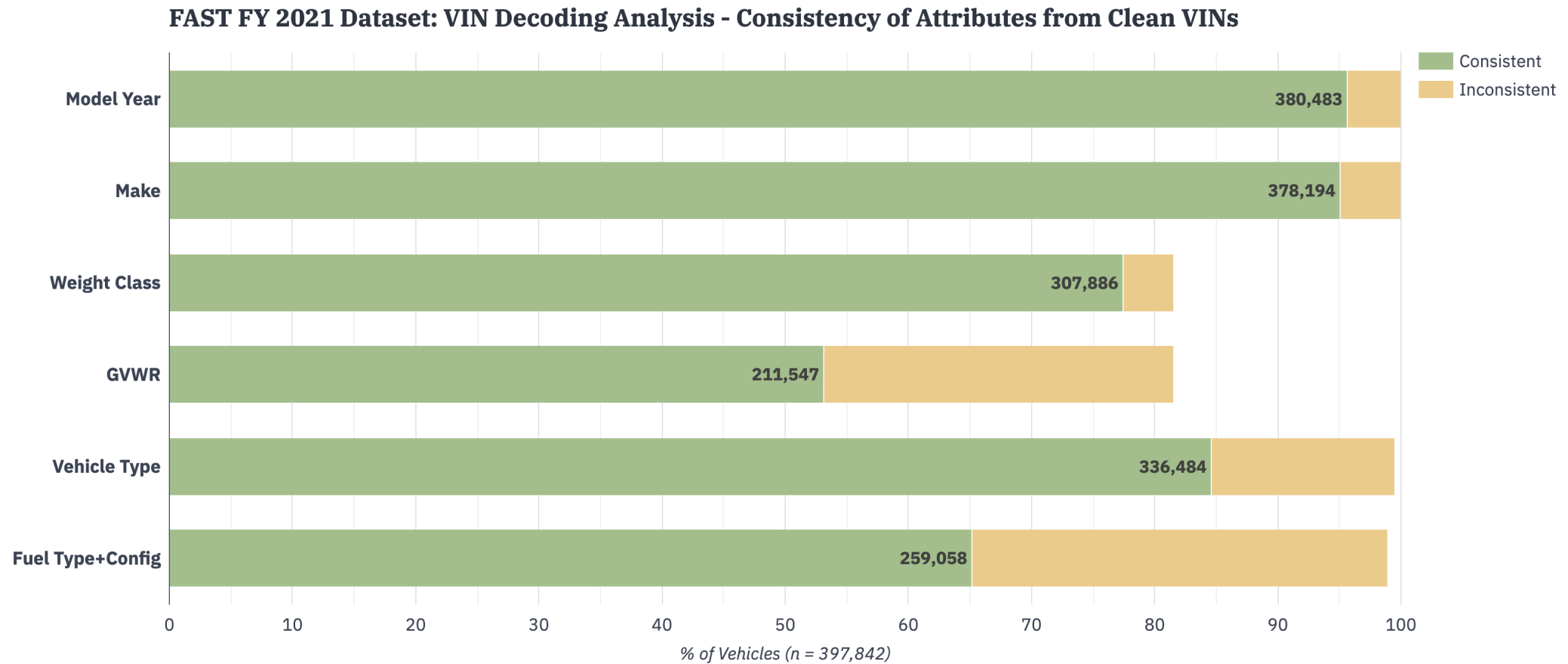
FAST FY 2021 Dataset: VIN Decoding Analysis - Attributes From VINs w/Multiple Errors



FAST FY 2021 Dataset: VIN Decoding Analysis - Attributes From VINs w/Significant Errors



Data Quality: VIN Decoding Analysis



Data Quality: VIN Decoding Analysis – Preliminary Conclusions

- **Reporting vehicles by VIN would not be a comprehensive solution to ensuring accuracy**
 - Too many gaps and areas of uncertainty: previous listed... and more identified in our analysis
 - Missing or indeterminate weights from VIN
 - Indeterminate make from VIN
 - Indeterminate vehicle types (e.g., no way to identify ambulances, incomplete vehicles)
- **There may be benefits to reporting vehicles by VIN**
 - It does enable (limited) accuracy checking
- **Decoded data from VINs can help agencies improve consistency and accuracy of their data**
 - We can share decoded vehicle attributes with interested agencies
 - We would like to work with agencies to vet and improve our analysis



FAST – Coming Changes

FAST – Coming Changes

- **Changes to fleet reporting based on EO 14057 requirements**
 - Likely will be small number of additional vehicle attributes
 - Initially optional but will be required in future year reporting
 - Details and timing will be communicated to agencies (~ June 2022?)
 - Incorporation of EVSE planning/tracking reporting
- **Tuning of validation business rules**
 - Usual annual review of range limits
 - Tuning of acquisition cost limits for armored vehicles
 - Consistency of fuel consumption locations for vehicles in outlying areas

FAST – Coming Changes

- **Tuning of validation business rules (cont'd)**
 - Changes to allowed content and length for fields like make and model
 - ... from GSA Fleet's systems modernization project
 - ... from VIN decoding analysis
 - Additional validation rules to improve the consistency of future-year projections data

FAST – Coming Changes

- Some other interesting efforts brewing in the background...

The screenshot shows the FAST/v2 web application interface. The browser address bar displays 'http://localhost:8080/f2/'. The page has a dark header with 'FAST/v2', 'Home', 'Sandbox', and 'Help' links. The main content area features a large heading 'Federal Automotive Statistical Tool/v2' followed by a description: 'FAST is the federal government's Web-based information system used by federal agencies to report information about the makeup, operation, planning, and compliance of their fleets of motor vehicles.' Below this is a 'Learn more about FAST' button. To the right is a login form with 'Email Address' and 'Password' input fields, a 'Sign in' button, and a link to the 'terms of use'. Below the login form are three informational boxes: 'Accessing FAST' (explaining user accounts), 'Forgotten Password?' (with a 'Request Password Reset' button), and 'Planned System Outage' (announcing an outage on Friday, May 4, 2022, due to a sensor jammer on the Millennium Falcon). At the bottom is a 'GSA's Federal Fleet Report' section with a brief description and links for 'More Information / Download' and 'Contact: vehicle.policy@gsa.gov'. The footer contains 'About', 'Terms of Use & Privacy Policy', 'Contact', and a timestamp: 'Generated: May 4, 2022 at 5:37:14 PM UTC (41 ms)'.

Contact Info

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FAST

 <https://fastweb.inl.gov/>



FAST Help

 <https://fastweb.inl.gov/help/>

FAST Support Team

 FASTsupport@inl.gov



Idaho National Laboratory

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